9-12.P.1.1. Students are able to **use** the Periodic Table to **determine** the atomic structure of elements, valence number, family relationships, and regions (metals, nonmetals, and metalloids).

Webb Level: 1
Bloom: Analysis

Verbs Defined:
Use – use
Determine – find appropriate information

Key Terms Defiend:
Atomic structure of elements - the # of protons, electrons, neutrons and where they are located with in the atom
Valence number – the # of outermost electrons in an atom
Family relationships – a group of elements with similar properties found in the same vertical column on the periodic table
Regions – areas of elements

Teacher Speak:
Students will be able to use the periodic table to determine (find information) about the atomic structure of elements (the # of protons, electrons, neutrons and where they are located with in the atom), valence number (the # of outermost electrons in an atom), family relationships (a group of elements with similar properties found in the same vertical column on the periodic table), and regions (areas of elements).

Student Speak:
I can use the periodic table to find information about:
- the # of protons, electrons and neutrons and where they are located within the atom (atomic structure of elements),
- the # of outermost electrons in an atom (valence number),
- groups of elements with similar properties found in the same vertical column on the periodic table (family relationships)
- areas of elements (regions).

9-12.P.1.2. Students are able to **describe** ways that atoms combine.

Webb Level: 2
Bloom: Comprehension

Verbs Defined:
Describe – tell in words or numbers

Key Terms Defined:
Ways –covalent, ionic and metallic
Atoms combine – electrons are shared and/or transferred between atoms

Teachers Speak:
Students will be able to describe (tell in words or numbers) three ways (covalent, ionic and metallic) that atoms combine (electrons are shared and/or transferred between atoms).

Student Speak:
I can tell in words or numbers (describe) how covalent, ionic and metallic bonds form (ways) based upon whether electrons are shared and/or transferred between atoms (atoms combine).

9-12.P.1.3. Students are able to **predict** whether reactions will speed up or slow down as conditions change.

Webb Level: 1
Bloom: Application

Verbs Defined:
Predict – to use information to make a best guess

Key Terms Defined:
Reaction - a chemical change in a substance
Conditions - temperature, surface area, concentration and catalysts

Teacher Speak:
Students will be able to predict (use information to make a best guess) whether reactions (a chemical change in a substance) will speed up or slow down as conditions (temperature, surface area, concentration and catalysts) change.

Student Speak:
I can use information to make a best guess (predict) about whether a chemical change in a substance (reaction) will speed up or slow down as:
- temperature changes,
- size of the particles changes,
- density of the particles changes
- catalysts (particles that affect the reaction without being altered themselves) are added.

9-12.P.1.4. Students are able to **balance** chemical equations by **applying** the Law of Conservation of Matter.

Webb Level: 2
Bloom: Application

Verbs Defined:
Balance (equations) – make both sides equal
Applying – to use what you know

Key Terms Defined:
Law of Conservation of Matter - total mass of reactants, starting materials, is equal to total mass of products, ending materials, in a chemical reaction

Teacher Speak:
Students will be able to balance (make both sides equal) chemical equations by applying (using what they know) the law of conservation of matter (total mass of reactants, starting materials, is equal to total mass of products, ending materials, in a chemical reaction).

Student Speak:
I can make both sides of chemical equations equal (balance) by using what I know about how the total mass of reactants, starting materials, is equal to total mass of products, ending materials, in a chemical reaction (Law of Conservation of Matter).

9-12.P.1.5. Students are able to **distinguish** among chemical, physical, and nuclear changes.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:
Distinguish – tell the difference

Key Terms Defined:
Chemical change- a reaction where different substances with different properties are formed
Physical change- a change in the form of a substance but not in its chemical composition
Nuclear change- a reaction that would cause the nucleus of an atom to gain particles, fusion, or lose particles, fission

Teacher Speak:
Students will be able to distinguish (tell the difference) among chemical (a reaction where different substances with different properties are formed), physical (a change in the form of a substance but not in its chemical composition), and nuclear changes (a reaction that would cause the nucleus of an atom to gain particles, fusion, or lose particles, fission).

Student Speak:
I can tell the differences (distinguish) among reactions that:
- form new substances with different properties (chemical change),
- change the form of a substance but not its chemical content (physical change)
- cause the nucleus of an atom to gain particles, fusion, or lose particles, fission (nuclear change).

9-12.P.2.1. Students are able to **apply** concepts of distance and time to the quantitative relationships of motion **using** appropriate mathematical formulas, equations, and units.

Webb Level: 2
Bloom: Analysis

Verbs Defined:
Apply/ing – to use what you know
Use/using– use

Key Terms Defined:
Concepts of distance and time – speed, velocity and acceleration
Quantitative relationships of motion – numerical values and graphs of speed, velocity and acceleration .
Formulas/equations - $V=\Delta D/\Delta t$ (velocity)
$Aavg=\Delta V/\Delta t$ (average acceleration)
$A=V_2-V_1/t$ (instant acceleration)
where…
Δ=change, D=distance, t=time, V=velocity, A=acceleration,
V_1 = starting velocity, V_2 = final velocity
Units – metric units of length per unit time

Teacher Speak:
Students will be able to apply (use what they know) concepts of distance and time (speed, velocity and acceleration) to find quantitative relationships of motion (numerical values and graphs of speed, velocity and acceleration) using appropriate mathematical formulas, equations and units.

Student Speak:
I can use what I know (apply) about concepts of distance and time to find numerical values using formulas/equations and graphs (quantitative relationships of motion) for:
- speed (change in distance/change in time) using appropriate metric units,
- velocity (speed with direction $V=\Delta D/\Delta t$) using appropriate metric units
- acceleration (average $Aavg=\Delta V/\Delta t$ and instant $A=V_2-V_1/t$) using appropriate metric units.

9-12.P.2.2. Students are able to **predict** motion of an object using Newton's Laws.

Webb Level: 2
Bloom: Application

Verbs Defined:
Predict – use information to make a best guess

Key Terms Defined:
Motion of an object - movement of anything with mass, including momentum
Newton's Laws - the three laws that govern all movements of objects: Law of inertia, Force- mass x acceleration, Action/Reaction

Teacher Speak:
Students will be able to predict (use information to make a best guess) motion of an object (movement of anything with mass, including momentum) using Newton's Laws (the three laws that govern all movements of objects: Law of Inertia, Force= mass x acceleration, Action/Reaction).

Student Speak:
I can use information to make a best guess (predict) about the movement of anything with mass, including momentum (motion of an object) using the three laws that govern all movements of objects: Law of Inertia, Force = mass x acceleration, Action/Reaction (Newton's Laws).

9-12.P.2.3. Students are able to **relate** concepts of force, distance, and time to the quantitative relationships of work, energy, and power.

Webb Level: 2
Bloom: Application

Verbs Defined:
Relate – tell in words or numbers the connections between/among

Key Terms Defined:
Force – a push or pull
Quantitative – expressed in numerical terms
Work – distance covered multiplied by push or pull applied
Energy – the capacity to do work
Power – the rate at which energy is transferred

Teacher Speak:
Students will be able to relate (tell in words or numbers the connections among) the concepts of a force, (a push or a pull) distance and time to the quantitative (expressed in

numerical terms) relationships of work (distance covered multiplied by push or pull applied), energy (the capacity to do work) and power (the rate at which energy is transferred).

Student Speak:
I can tell in words or numbers the connections among (relate) the concept of a push or pull (force), distance and time using numerical terms (quantitative) that express the relationship of:
- distance covered multiplied by push or pull applied (work)
- the capacity to do work (energy)
- how fast work is done over a time period (power).

9-12.P.3.1. Students are able to **describe** the relationships among potential energy, kinetic energy, and work as applied to the Law of Conservation of Energy.

Webb Level: 2
Bloom: Application

Verbs Defined:
Describe – tell in words or numbers

Key Terms Defined:
Relationships – connections
Potential energy - energy that is stored
Kinetic energy - energy that is based on movement of matter
Work – energy that is transferred through motion
Law of Conservation of Energy – energy is neither created nor destroyed in any chemical or physical changes

Teacher Speak:
Students will be able to describe (tell in words and numbers), the relationships (connections) among potential energy (energy that is stored), kinetic energy (energy that is based on movement of matter), and work (energy that is transferred through motion) based on what they know about the Law of Conservation of Energy (energy is neither created nor destroyed in any chemical or physical changes).

Student Speak:
I can use what I know about how energy is neither created nor destroyed in any chemical or physical changes (Law of Conservation of Energy) to tell in words and numbers (describe), the connections (relationships) among
- energy that is stored (potential energy)
- energy that is based on movement of matter (kinetic energy)
- energy that is transferred through motion (work).

9-12.P.3.2. Students are able to **describe** how characteristics of waves are related to one another.

Webb Level: 2
Bloom: Comprehension

Verbs Defined:
Describe – tell in words or numbers

Key Terms Defined:
Characteristics of waves – frequency, wavelength, amplitude, speed, period.

Teacher Speak:
Students will be able to describe (tell in words or numbers) how the characteristics of waves (frequency, wavelength, amplitude, speed and period) are related to one another.

Student Speak:
I can tell in words or numbers (describe) how the frequency, wavelength, amplitude, speed and period (characteristics of waves) are related to one another.

9-12.P.3.3. Students are able to **describe** electrical effects in terms of motion and concentrations of charged particles.

Webb Level: 2
Bloom: Application

Verbs Defined:
Describe – to tell in words or numbers

Key Terms Defined:
Electrical effects – magnetism, flow of electrons, attraction/repulsion of objects
Motion of charged particles – electrical current, resistance, and static discharge
Concentration of charged particles – voltage or buildup of static charge

Teacher Speak:
Students will be able to describe (tell in words or numbers) about electrical effects (magnetism, flow of electrons, attraction/repulsion of objects) in terms of motion of charged particles (electrical current, resistance, and static discharge) and concentration of charged particles (voltage or buildup of static charge).

Student Speak:
I can tell in words or numbers (describe) about magnetism, flow of electrons and attraction/repulsion of objects (electrical effects) in terms of:
- electrical current, resistance, static discharge (motion of charged particles),

- voltage, buildup of static charge (concentration of charged particles).